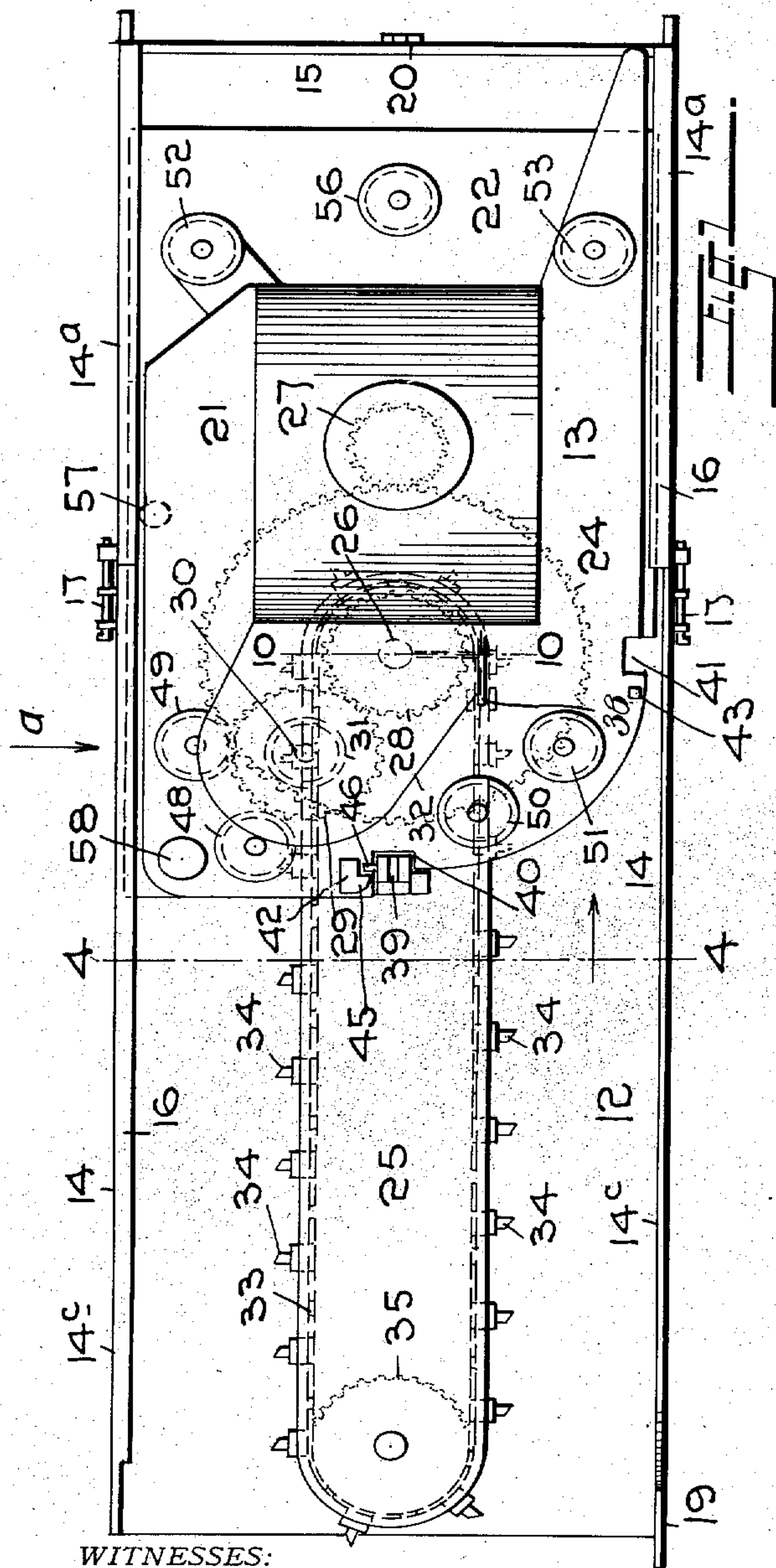


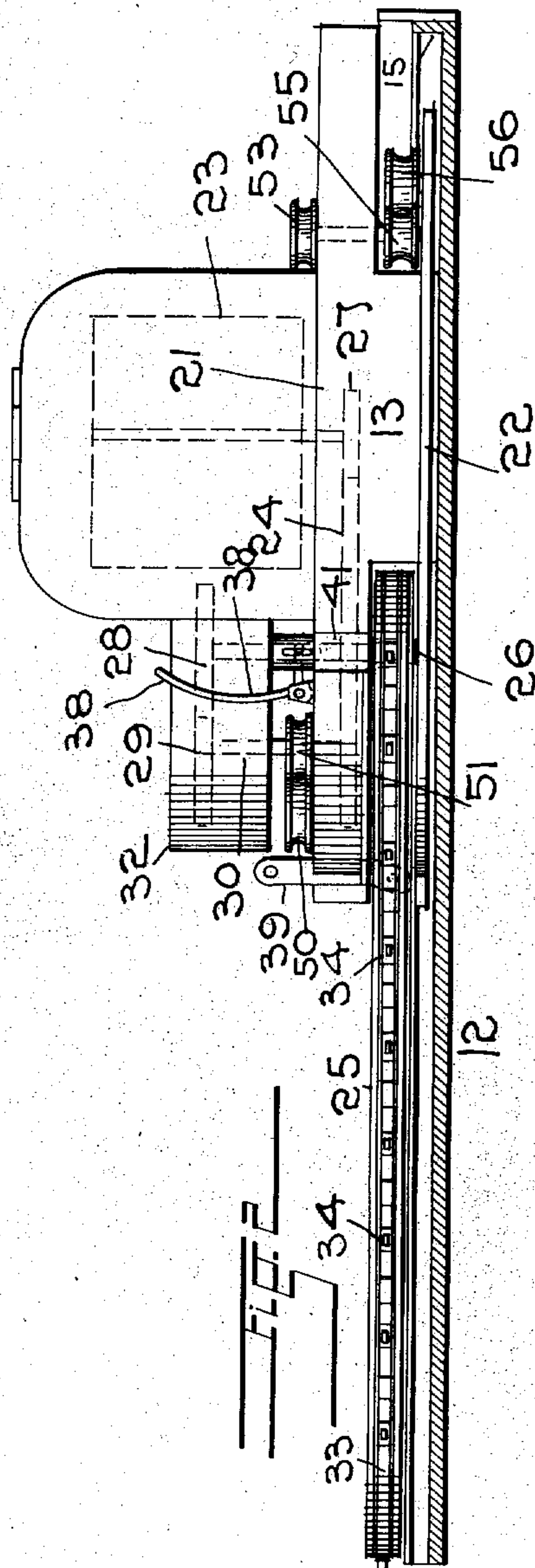
J. LIPPIS.
COAL CUTTING MACHINE.
APPLICATION FILED NOV. 8, 1906.

6 SHEETS—SHEET 1.



WITNESSES:

N. M. Stump
B. B. Armsby



INVENTOR.

Johns Lippis

BY

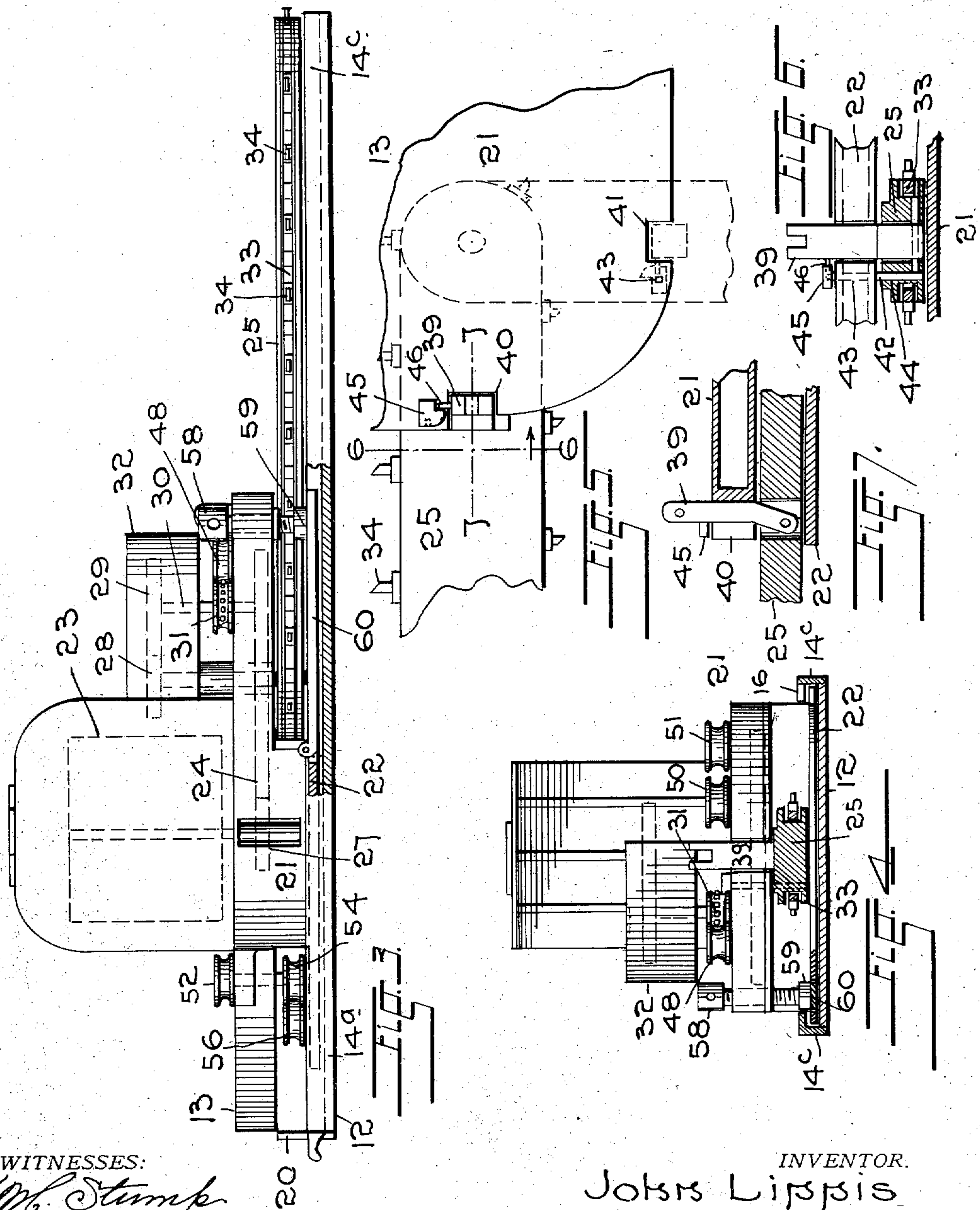
F. J. Delaney
ATTORNEY.

No. 862,832.

PATENTED AUG. 6, 1907.

J. LIPPIS.
COAL CUTTING MACHINE.
APPLICATION FILED NOV. 8, 1906.

5 SHEETS—SHEET 2.



WITNESSES:

A. M. Stump
B. B. Armsby

INVENTOR.

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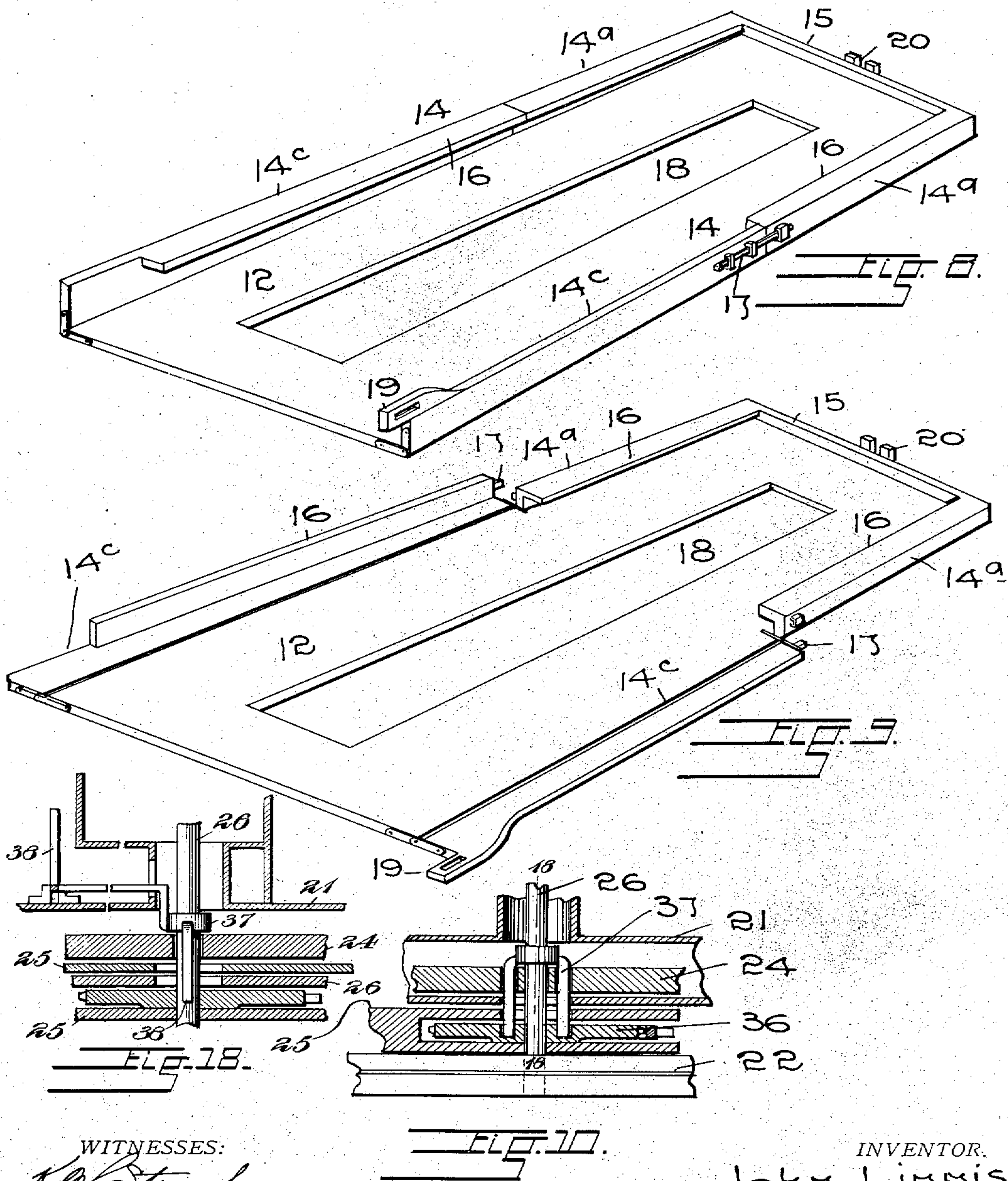
J. J. P. P. P.
ATTORNEY.

No. 862,832.

PATENTED AUG. 6, 1907.

J. LIPPIS.
COAL CUTTING MACHINE.
APPLICATION FILED NOV. 8, 1906.

5 SHEETS—SHEET 3.



WITNESSES:

J. W. Stump
B. B. Crosby

INVENTOR.

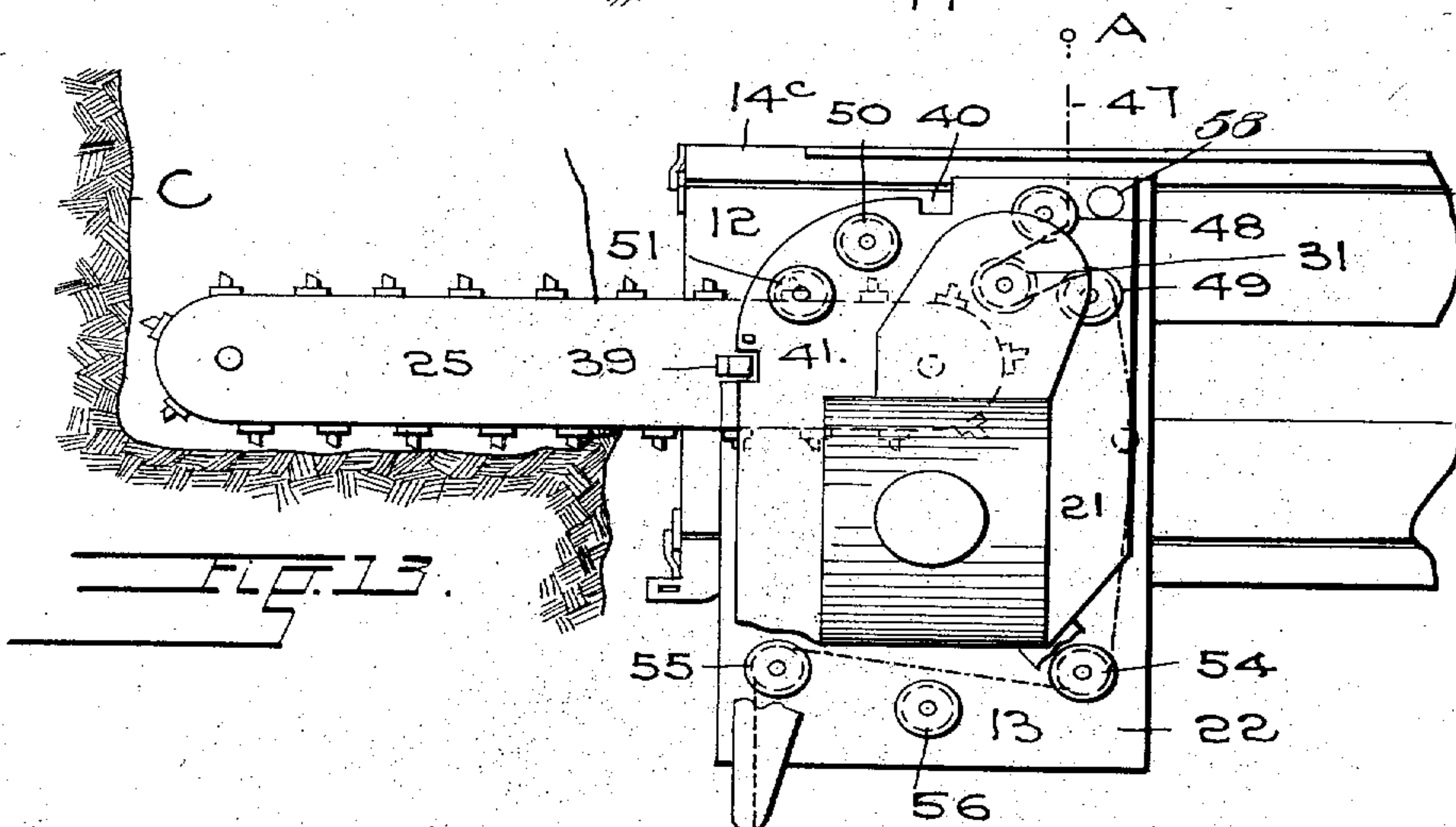
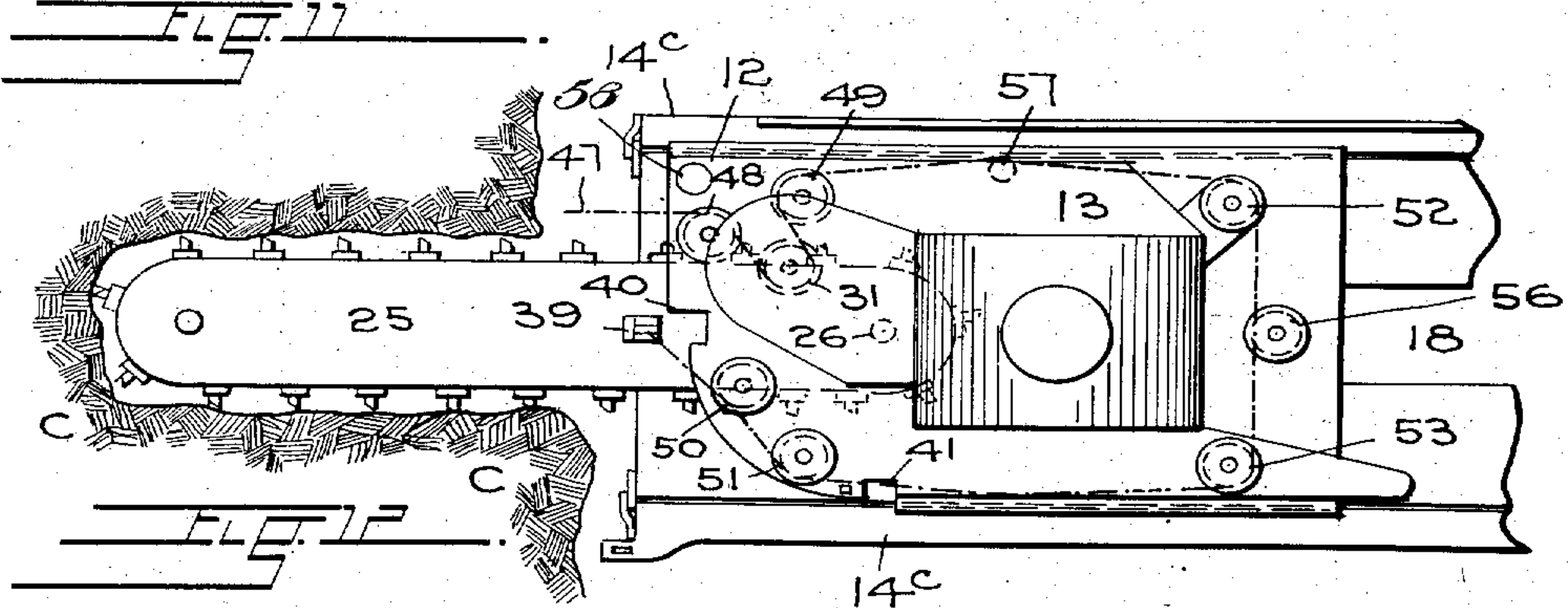
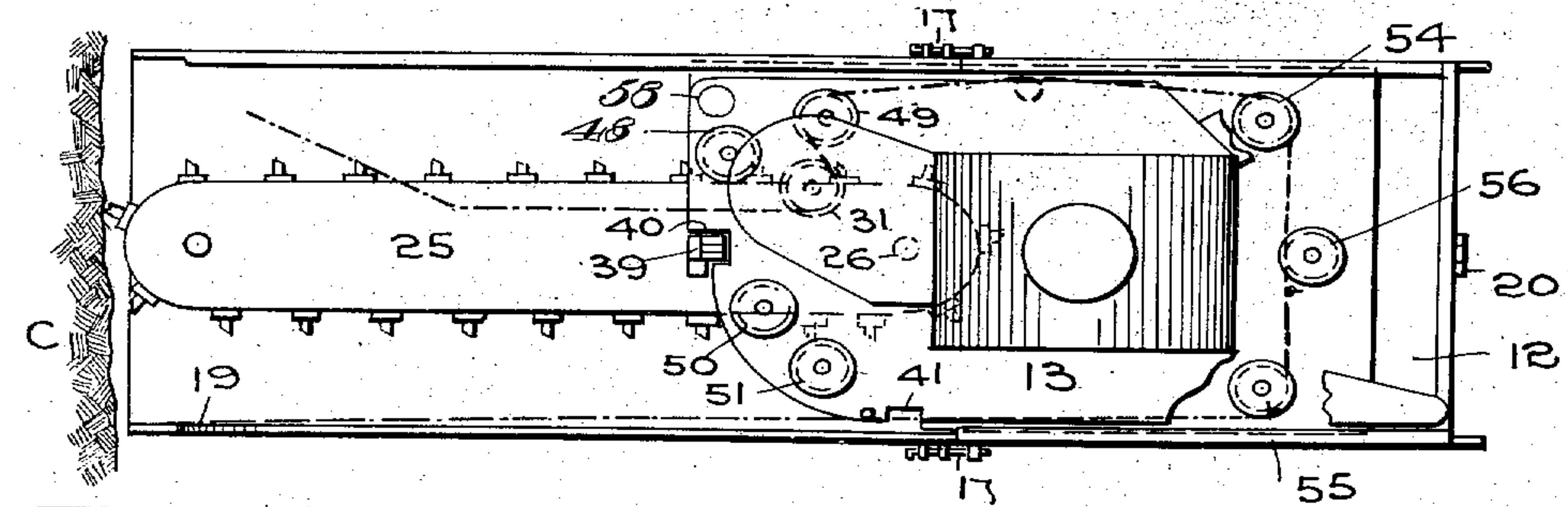
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BY

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J. LIPPIS.
COAL CUTTING MACHINE.
APPLICATION FILED NOV. 8, 1906.

5 SHEETS—SHEET 4.



WITNESSES:
H. M. Stumpf
B. B. Armsby.

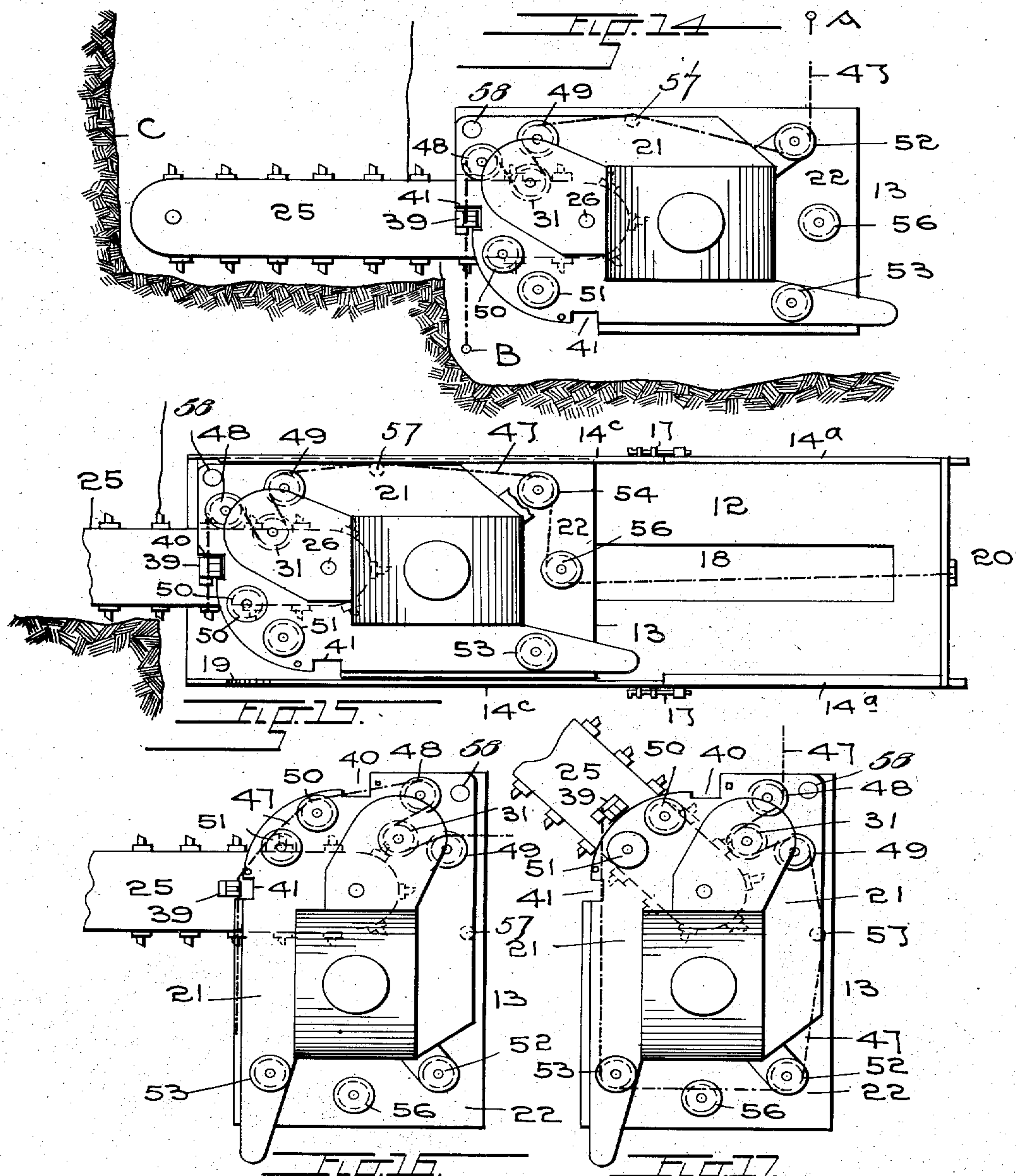
INVENTOR.
Johns Lippis
BY *J. J. Dellandrea*
ATTORNEY.

No. 862,832.

PATENTED AUG. 6, 1907.

J. LIPPIS.
COAL CUTTING MACHINE.
APPLICATION FILED NOV. 8, 1906.

5 SHEETS—SHEET 5.



WITNESSES:

T. M. Stumpf
B. B. Ormsby

INVENTOR.

Johns Lippis

BY *J. J. McLaughlin*
ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN LIPPIS, OF COALCREEK, COLORADO.

COAL-CUTTING MACHINE.

No. 862,832.

Specification of Letters Patent.

Patented Aug. 6, 1907.

Application filed November 8, 1906. Serial No. 342,531.

To all whom it may concern:

Be it known that I, JOHN LIPPIS, a citizen of the United States of America, residing at Coalcreek, in the county of Fremont and State of Colorado, have invented certain new and useful Improvements in Coal-Cutting Machines, of which the following is a specification.

This invention relates to improvements in coal cutting machines and more particularly in the class of so-called undercutting machines, the movements of which are governed by means of a chain engaging a revolving sprocket wheel and one or more appropriately disposed guide-sheaves.

The principal object of the invention is to produce a machine of the class named which, being adapted to operate in a limited space, is applicable under all conditions and may be used for both long wall and room and pillar work. My invention thus obviates the employment of separate machines to perform the two distinct classes of work and in consequence saves time, labor and expense. I attain these objects by the mechanism illustrated in the accompanying drawings in the various views of which like parts are similarly designated and in which

Figure 1—represents a plan view of the device, Fig. 2—a side elevation thereof, the stationary member or "pan" being shown in section, Fig. 3—a side elevation, looking from a point "a", Fig. 1, Fig. 4—a cross section taken along a line 4—4, Fig. 1, looking in the direction of the arrow, Fig. 5—a fragmentary plan view of the movable element of the device, illustrating the means to lock the cutter arm thereon, Fig. 6—a cross section taken along a line 6—6, Fig. 5, Fig. 7—a longitudinal section taken along a line 7—7, Fig. 5, Fig. 8—a perspective view of the pan employed to guide and support the movable element of the device, Fig. 9—a similar view of the pan with the hinged portions of its flanged sides in the opened position to permit lateral displacement of the element supported thereon, Fig. 10—a cross sectional view along a line 10—10, Fig. 1, illustrating the mode of clutching the cutter-chain-driving wheel, Fig. 11—a plan view of the device in readiness to move longitudinally into the wall of coal, Fig. 12—the same in readiness to be turned at right angles, prior to commencing the long wall operation, Fig. 13—the machine in the position when moving off the pan while making a continuous undercut along the face of the drift, Fig. 14—the same nearing the extreme end of the drift in position to permit operation of the cutter bar in close proximity to the end wall, Fig. 15—a plan view illustrating the position of the operating chain to replace the movable element of the device upon the, in practice, stationary member or pan, Figs. 16 and 17—similar views illustrating the mode of employing the chain for the purpose of changing the position of the cutter bar to avoid impenetra-

ble places in the rock and Fig. 18—a fractional section taken along the line 18—18, Fig. 10.

The device consists of two elements 12 and 13, the former of which, commonly known as the "pan", consists of an oblong bottom plate provided at its two side-edges and at one of its end edges respectively with upwardly extending rims 14 and 15. Rims 14, extending along the sides of the plate, are provided with inwardly extending flanges 16 and are divided into stationary portions 14^a, which adjoin the end rim 15 and movable hinged portions 14^b at the front end of the device. The last named parts of the flanged sides may be locked in the upright position by means of suitably disposed slide bolts 17 or analogous means. Pan 12 is furthermore provided with a central oblong slot 18 for the purpose of connecting the motor mounted on the movable element 13, with the wheels of a suitably constructed truck, when it is desired to transport the device under its own power, to a distant part of the mine or quarry.

As the truck and the therewith connected propelling means have no bearing on the invention, herein disclosed, they have been omitted from the drawings.

In addition to the above named features, the pan has two lugs 19 and 20 respectively situated at the foremost portion of one of the sides and at the center of the end rim 15 and adapted to secure the operating chain for the purposes hereinafter to be described.

The element 13, which in practice is placed upon the pan, is composed of two connected, horizontal, superposed members 21 and 22, the upper one of which carries the electric motor 23 and incloses the transmission gear 24, while the lower, flat member engages the upper surface of the bottom plate of the pan and extending below the flanges 16, guides the movable element during its longitudinal movement.

25 designates the cutter bar which is pivotally mounted on the frame 13 intermediate its two members, by means of a vertical shaft 26, which being journaled on the frame, extends above its upper surface.

Mounted upon the shaft to revolve therewith are the above named gear wheel 24, which receives its rotary movement from the motor by means of a pinion 27, and a second gear wheel 28, which being secured at the upper extremity of the shaft, meshes into a similar wheel 29 at the upper end of a vertical shaft 30 which being revolubly mounted above the upper surface of the movable frame, carries the driving sprocket wheel 31. The gearing is preferably inclosed in a casing 32 to exclude dirt and other obstructions.

The cutter bar 25 carries the endless chain 33 which is armed with the usual cutting tools or bits 34 and is revolubly mounted on the horizontally disposed wheels 35 and 36 at the extreme ends of the bar. The last named wheel 36, which being located at the inner end of the bar, drives the chain, loosely surrounds the be-

fore named shaft 26 and may be operatively connected therewith by means of a clutch 37, which in practice is manipulated through instrumentality of a lever 38.

It should be observed that the motor, gearing and clutch, as well as the cutter bar and chain, not forming part of my invention, have not been illustrated or described in detail, the first named members being shown and mentioned merely to aid in giving an intelligent representation of the construction and operation of those parts which in addition to the peculiar features of the pan, I claim as my invention and which will now be described.

The cutter bar may be held on the frame 13 in two positions viz, in alinement with the longitudinal axis of the elements of the machine as illustrated in Figs. 1 and 2, or at right angles thereto as is shown in Figs. 5 and 13.

The locking means employed to secure the bar in either position, consists of an arm 39, which extending upwardly from the cutter bar, is pivotally mounted thereon at its lower extremity and is adapted to enter correspondingly shaped notches 40 and 41 cut in the outer edge of frame 13 and respectively disposed in the longitudinal axis thereof and at right angles thereto.

To prevent the arm 39 from moving about its pivot while in engagement with one of the notches, a preferably angular bolt 42 is employed which in practice is non-rotatably held in vertically alined correspondingly formed apertures 43 and 44 respectively in the upper member of frame 13 and the adjacent portion of the cutter bar and which is provided with an integral recessed head 45 adapted to receive and secure a pin 46 projecting laterally from the locking arm 39.

Fig. 5 of the drawings illustrates the two positions of the cutter bar and the locking means, the position at right angles to the longitudinal axis of the machine having been delineated in broken lines.

To move the bar from one position to the other, the clutch 37 is raised out of engagement with the cutter chain wheel 36 by manipulation of lever 38, after which bolt 42 is retracted from the apertures in the frame and the bar and the arm 39 thrown out of engagement with the notch by turning it about its pivot, which renders the bar free to turn around the shaft 26 in either direction.

During the operation of the machine, to adapt it to varying conditions and requirements, it is essential that it should move readily in various directions, relative to the stationary member or pan, or to the coal body it is desired to penetrate. This object is attained by means of a chain 47 which engages the before mentioned driving sprocket wheel 31 and in accordance with the nature of the movement it is desired to impart to the frame, with one or more of a plurality of guide sheaves which are rotatably disposed upon the upper and lower members of frame 13.

In the drawings the chain is for the sake of clearer illustration, omitted from Figs. 1, 2, 3 and 4 and represented in Figs. 11 to 17 inclusive by a dash-dot line where it is exposed and by a broken line where it is obstructed by superposed parts of the machine.

Of the above mentioned sheaves, six are located upon the upper surface of the uppermost member and three upon the lower or plate member of the movable frame 13. Those upon the upper member 21 are respectively des-

ignated in the drawings by the reference numerals 48, 49, 50, 51, 52 and 53 and those on the lower plate 22 by numerals 54, 55 and 56. Sheaves 48, 49, 50 and 51 are divided into pairs, the centers of which are approximately disposed in lines subtending the angles of the foremost corners of the frame, while the centers of those designated by 52 and 53 are oppositely located in a line at right angles to the longitudinal axis of the element at the rear end of the upper member. Sheaves 54 and 55 on the lower member 22 are axially alined with sheaves 52 and 53, each pair being mounted upon a common vertical shaft to simplify the construction of the device. The third sheave 56 on the lower member is placed in the longitudinal axis of the frame in between sheaves 54 and 55, in proximity to the rear edge of the plate 22. A guide roller 57 disposed on the side of the machine intermediate sheave 49 and the pair comprising sheaves 52 and 54, is intended to hold the chain from engagement with the edge of the device. A capstan screw 58, at one of the corners of the movable element, is rotatably held in the upper member 21 and engages a coöperatively threaded nut 59 upon a fulcrumed portion 60 of the lower member 22, for the purpose of tilting the cutter arm. This feature of my invention having an object separate from that of the mechanism and arrangement of parts hereinbefore set forth, has been made subject of a separate application for patent Serial #344,656, filed Nov. 22, 1906.

Having thus described the mechanical construction of my invention, its operation will now be described, reference being had to the different positions illustrated in Figs. 11 to 17 inclusive, of the drawings. In operation, the element 13 either moves upon the element 12 which is stationary, or the latter is temporarily discarded when the machine 13 travels along the surface of the tunnel or room of the mine. The frame 13 is impelled, during its various movements, by means of the sprocket wheel 31, which receiving its rotary movement from the electric motor, as heretofore described, engages the chain 47 which to this end, is held in fixed position, either on the pan or on suitably located supports. The movements of the frame 13 and of the cutter arm are controlled by varying the position of the chain in relation to the various guide sheaves and the stationary supports, as will now be described.

Referring to the drawings, Fig. 11 illustrates the frame 13 at the rear end of the pan, the cutter bar extending in alinement with its longitudinal axis and the cutter tools, on the chain in engagement with the face of the coal which is designated in the drawings by the reference character C. The chain 47 is secured to the lug 19 at the front of the pan, from where it passes along the side of the movable frame consecutively around sheaves 55, 56 and 54 on the lower member 22 of the device and sheave 49 and the sprocket wheel 31 on the upper member. The opposite or free end of the chain is held by the operative who, by energization of the motor, causes the driving sprocket wheel to revolve along the chain and to consequently impart a longitudinal movement to the element 13 and the therewith connected cutter bar which by action of the cutting tools on the revolving endless chain, penetrates into the coal.

Fig. 12 shows the frame 13 at the front end of the pan and the cutter bar projecting into the wall of the

room or drift. The movable sides of the pan are let down in a plane with its upper surface and the locking arm 39 is placed out of engagement with the notch 40. The end of the chain is in this instance, secured to the upper extremity of the arm and passes from there consecutively around guide sheaves 50, 51, 53, 52 and 49, sprocket wheel 31 and sheave 48 on the upper member 21 of the machine. The clutch 37 is subsequently raised out of engagement with the driving wheel 35 on the cutter bar, and the sprocket wheel 31 being actuated, causes the frame 13 to move about the vertical shaft 26 until it has described an angle of 90 degrees when the arm 39 on the cutter bar is projected into the notch 41 and locked by the means heretofore described. The machine is now in the position illustrated in Fig. 13, and the chain being secured at its extremities to supports A and B at opposite ends of the drift, tunnel or room is placed in engagement consecutively with sheave 48, sprocket wheel 31 and sheaves 49, 54 and 55. The machine is now in readiness to be propelled along the face or breast of the coal wall, which is accomplished by actuation of the wheel 31 and results in a kerf being cut in the lowermost portion of the wall for the purpose of separating the superposed coal from the inclosing rock. It should be observed that the machine in this position may move in a minimum space between the wall and the props or pillars which support the roof of the passage, and by obviating the employment of a separate machine or the removal of the props, saves considerable labor and time. When the machine, which it will be noticed, moved off the pan onto the surface of the drift or room, has neared the end of the wall, as shown in Fig. 14, it is returned to its former position by raising the clutch and disengaging the arm 39, after which the latter is again locked in place in the notch 40 at the front end of the machine. This operation is performed to enable the cutter bar to reach the extreme end of the working face which is accomplished by placing the chain, the ends of which are still held on the supports A and B, consecutively around sheaves 52 and 49, the sprocket wheel 31 and sheave 48. To replace the element 13 on the pan, its rear end is slightly raised and placed upon the extreme end of the former. The chain 47 is now secured to the lug 20 at the opposite end of the pan and passed consecutively around sheaves 56 and 54 on the lower member of frame 13 and around sheave 49, sprocket wheel 31 and sheave 48 on the upper member. The operative holding the loose end of the chain now energizes the motor until the moving element has reached its original position at the rear end of the pan, when the entire device may be mounted upon a suitable truck to be conveyed to another part of the mine.

Figs. 16 and 17 illustrate another application of the chain in coöperation with the sheaves on the device, in case of emergency when, on encountering a hard and refractory substance in the wall, it is desirable to move the cutter arm out of engagement therewith without changing the position of the machine. The chain in Fig. 16 is secured in the locking arm which has previously been disengaged from the notch in the edge of the frame, and passed around sheaves 51, 50, 48, sprocket wheel 31 and sheave 49. Actuation of the sprocket wheel conveys the cutter arm to the position illustrated in Fig. 17, from where it may be returned

to its original position by placing the chain consecutively around sheave 48, driving wheel 31 and sheaves 49, 52 and 53 and securing its end to the locking arm 39.

It will thus be observed that by reason of the peculiar arrangement of the sheaves on the movable element of the device, in connection with the variable position of the cutter arm and the improved construction of the pan, the frame may be turned or propelled to suit all possible conditions and requirements, either in long wall or room and pillar work and that the compacture of its parts and the absence of out-riggers and other projections permit its employment in a minimum of space, which owing to the unavoidable narrowness of the passages in coal mines, is of paramount importance.

Having thus described my invention what I claim is:—

1. A coal cutting machine comprising in combination, a pan element having partly movable sides and an element movably supported thereon.

2. A coal cutting machine comprising in combination a pan element having flanged sides divided into stationary rear portions and movable front portions, means to retain the latter in an upright position, and an element movably supported upon the said pan.

3. In a coal cutting machine, a movable frame having peripheral recesses and bolt holes adjacent thereto, a cutter bar pivotally mounted thereon, a locking arm upon the bar arranged to be positioned in either of the said recesses, the said bar having an opening arranged to be aligned with the adjacent bolt hole when the arm is thus positioned, and a bolt adapted to be inserted in the aligned openings and by engagement with the arms secure it upon the frame.

4. A coal cutting machine comprising in combination a stationary element, an element movably supported thereon, a driving wheel and a plurality of guide members upon the latter, and a flexible member fixed upon the said stationary member in engagement with the said guide members and the driving wheel so as to cause, by rotation of the latter, longitudinal movement of the movable element.

5. A coal cutting machine comprising in combination, an element having a cutter member, a driving wheel and a plurality of guide members upon the said element, and a flexible member held upon a suitable support and engaging the said guide members and the driving wheel, so as to cause, by rotation of the latter, longitudinal movement of the element.

6. In a coal cutting machine, a frame, a cutter bar pivotally connected therewith, a driving wheel and a plurality of guiding members upon the said frame, and a flexible member fixed upon the said bar, in engagement with the guiding members and the driving wheel so as to cause, by rotation of the latter, rotary movement of the frame about the pivot, when the bar is held against displacement.

7. In a coal cutting machine, a frame, a cutter bar pivotally mounted thereon, a driving wheel and a plurality of guiding members upon the said frame, and a flexible member fixed upon the said bar, in engagement with the said guiding members and the said driving wheel, so as to cause, by rotation of the latter, movement of the cutter bar about its pivot.

8. In a coal cutting machine, a frame, a cutter bar pivoted thereon and held at an angle to its longitudinal axis, a driving wheel and a plurality of guide members upon the said frame, and a flexible member fixed upon opposite supports, in engagement with the said guiding members and the driving wheel so as to cause, by rotation of the latter, linear movement of the frame between the said supports.

9. In a coal cutting machine, a frame, a cutter bar pivoted thereon and held in alignment with its longitudinal axis, a driving wheel and a plurality of guiding members upon the said frame, and a flexible member fixed upon opposite supports in engagement with the guiding members and the driving wheel, so as to cause by rotation of the latter, lateral movement of the frame.

10. In a coal cutting machine a substantially rectangular frame, a cutter bar extending in front thereof, a driving wheel thereon, two pairs of guiding members respectively situated approximately in the lines subtending the
5 foremost corners of the said frame, and a flexible member engaging the said driving wheel and one or more of the said guiding members.

11. In a coal cutting machine, a substantially rectangular frame, a cutter bar pivotally mounted in proximity to its foremost edge, a driving wheel upon the frame, two
10 pairs of guiding members on the frame, approximately in lines subtending its foremost corner, two guiding members respectively in adjacency to its rearmost corners, and a flexible member engaging the said driving wheel and one
15 or more of the said guiding members.

12. In a coal cutting machine, a substantially rectangular frame, comprising two superposed members, a cutter bar pivotally mounted in proximity to its foremost side, a driving wheel upon the upper member, guiding members ar-

ranged in adjacency to the corners of the said upper member, guiding members in proximity to the rearmost corners of the lower member, and a flexible member engaging the driving wheel and one or more of the guiding members. 20

13. In a coal cutting machine, a substantially rectangular frame, comprising two superposed members, a cutter
25 bar pivotally mounted in proximity to its foremost side, a driving wheel upon the upper member, guiding members arranged in adjacency to the corners of the said upper member, guiding members in proximity to the rearmost corners of the lower member, a guiding member intermediate
30 of the latter, and a flexible member engaging the driving wheel and one or more of the guiding members.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHN LIPPIS.

Witnesses:

JOSEPH D. BLUNT,
MAMIE WOODS.

DISCLAIMER.

862,832.—*John Lippis*, Coalcreek, Colo. COAL-CUTTING MACHINE. Patent dated August 6, 1907. Disclaimer filed May 1, 1916, by the patentee.

Enters his disclaimer—

“To claims numbered 8 and 9 of said patent, which are in the following words:

“8. In a coal cutting machine, a frame, a cutter bar pivoted thereon and held at an angle to its longitudinal axis, a driving wheel and a plurality of guide members upon the said frame, and a flexible member fixed upon opposite supports, in engagement with the said guiding members and the driving wheel so as to cause, by rotation of the latter, linear movement of the frame between the said supports.

“9. In a coal cutting machine, a frame, a cutter bar pivoted thereon and held in alinement with its longitudinal axis, a driving wheel and a plurality of guiding members upon the said frame, and a flexible member fixed upon opposite supports in engagement with the guiding members and the driving wheel, so as to cause by rotation of the latter, lateral movement of the frame.”

[*Official Gazette*, May 9, 1916.]

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In testimony whereof I have affixed my signature in presence of two witnesses.

JOHN LIPPIS.

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